Payment Issues for the Turn of the Century
Electronic Commerce and Payments Conference

Cathy E. Minehan, President
Federal Reserve Bank of Boston

September 19, 1996

I am happy to be here and participate in this Electronic Commerce and Payments Conference. Although I am more routinely focused on monetary policy matters in my new position, I continue to have a deep interest in payment system issues. How could it be otherwise? A healthy payment system is vital to ensuring financial stability and economic growth. And besides, the extent of change in the payment system today makes it an exciting area.

The banking industry is in the midst of a significant transformation today, with interstate branching and increasing consolidation. In the past decade the number of U.S. banks has declined from more than 14,000 to about 11,000 and may be as low as 7,000 by the turn of the century. We and others expect bifurcation in the industry by that time, with a few very large, interstate and international institutions at one end and a rather large number of smaller niche players at the other. The payments system is also in the midst of significant transformation with the increasing globalization of payments, the increasing involvement of new non-bank participants and the proliferation of new forms of payments.

The consistent theme in all this change is a veritable technological revolution: technology has created the possibility of economies of scale in banking, it has enabled small players to keep pace, it has helped operations span the globe, enhanced business opportunities and certainly created product options never before available. But the road from technological innovation to profitable, well controlled final processes is not always smooth.

I'd like today to reflect on some aspects and potential hazards of technology drawing on the work of Nathan Rosenberg of Stanford University who spoke at a recent Boston conference on uncertainty and technological change. From him, we can learn some lessons about why it is so difficult to anticipate the future impact of successful innovation, and why it may not be wise to be totally sanguine about technology as a cure for all ills. I will focus my remarks more on retail payments because we have some responsibility for that area at the Federal Reserve Bank of Boston and that's the area where I think we can expect to see the most significant transformation in payments in our own country. I will also rely on my experience in the 1970's and 80's with changes that occurred in the wholesale payments system.

Finally, I would like to talk about the role I believe the Federal Reserve can play as a policy maker, service provider and regulator in the transformation of the payment system.

Ideally at the turn of the century the payments system in the United States would be fully electronic with safeguards that would control both systemic risk and the risk of individual loss. All individuals and corporations would have access to the payments system through a variety of convenient and efficient mechanisms, and the cost of the payments system would be a fraction of its current level. Contrast this vision with the retail payments system of today which is predominantly paper-based, has increasing rather than decreasing levels of fraud, has few widely accepted forms of payment for most individuals and only cash for most of the unbanked population, and where costs have been estimated at one half to one percent of the gross domestic product for checks alone. How do we get from the reality of today to this future vision? And why hasn't the technological innovation we've experienced taken us further along this path?

In answering these questions, we can gain insights from Professor Rosenberg's thoughts about uncertainty and technological change.

Rosenberg poses the following five reasons why it is so hard to fully realize the impact of technological innovation:

- New technologies are all initially introduced in a primitive state so that their use is not readily apparent.
- Innovations generally require complementary inventions.
- Entirely new technological systems are often needed to take full advantage of innovations, but we have a difficult time conceptualizing these systems.
- Solutions are developed for specifically identified problems, but then can be used in totally unexpected contexts.
- And, finally, innovations may be technically feasible, but are useful only if they meet someone's needs in a cost effective manner.

Let's look at each of these issues in light of the significant change we believe is necessary in the retail payments system.

New technologies generally are introduced in a fairly primitive state, and it is hard to foresee future improvements and their economic consequences. The internet provides an example here. The internet has been around a long time; it is free, no one owns it; no one

oversees, controls or secures it and no one knows how useful it may ultimately be in the payments arena. The very aspects that make the internet so flexible and foster its incredible growth, make it less than ideal for payments. Some believe that additional developing technologies and standards will provide adequate security on the internet for payments, but this is yet to be fully demonstrated.

Uncertainty also exists with technological change because often complementary innovations are required that may not exist yet. This explains why major innovations often take a long time to be developed and diffused. In our vision we see a fully electronic payments system. Today the most prevalent form of electronic retail payments is the automated clearing house. The Federal Reserve played a key role in the development of the automated clearing house in the early 70's. We ask ourselves why today we have only three billion electronic ACH payments while we still have 60 billion and growing numbers of check payments. At least part of the reason is that complementary technologies need to develop to allow the automated clearing house to reach its full potential. Personal computers and the internet are ACH complements - they can now provide a means for consumers to initiate

payment instructions to a bank or a processor who can use the automated clearing house to transfer value electronically and obtain settlement.

We have too often looked at the payments system narrowly. If you look end to end, you see a significant infrastructure that has developed over time to support the check payments system. We have a comprehensive legal framework and a huge investment in checks that provides convenience and safety to consumers and corporations and that provides significant income to the banking industry. This investment is retarding the banking industry's ability to move forward with the new technologies required to move to a more electronic payments system and is enabling new participants, who are often not banks, to be the early adopters of the electronic technologies. While banks focus their attention in large part on geographic expansion and consolidation of existing systems, non-banks are bringing to market the complementary technologies required to transform the retail payments system.

Innovations also require that we be able to conceptualize entirely new technological systems. Of course, tunnel vision is a hazard in any

industry, including financial services, and thus we are more apt to overlay new technology on our existing processes. For example, new forms of electronic payments often attempt to replicate the existing paper system by creating electronic forms of checks and mimicking the work flows of the check system. In this case, I think we need to marry the new technological developments with some of the tools that are available from new approaches to management such as Total Quality Management. These tools, which we have found to be very useful, can allow us to map existing payment processes, understand their components, and streamline them as we develop new technologies.

New technologies are typically developed to solve specific problems but may have application in unanticipated contexts. In this regard, major innovations are ones that induce further innovation and investment. Image technology, for example, has been in use in many industries for years. The Federal Reserve began to explore its use in check services ten years ago with some R&D at the Boston Bank. The jury is still out on the extent to which image will help us transform the paper-based payments system to a system in which checks are collected in a secure fashion electronically. However, we need to test

this new technology in a variety of contexts to understand its full potential.

Our crystal ball is further clouded by the fact that the impact of technology is not based solely on feasibility and technological performance but depends on meeting the needs of users in novel and cost-effective ways. Often these are needs that individuals and corporations have not yet recognized. Consumers today are largely satisfied with the check payment system. Checks are convenient and easy to use and widely accepted. However, consumers have begun to understand that new technologies can provide even greater convenience. ATM machines are available at hours and locations that provide far greater accessibility to cash than the check system provides. Debit cards, home banking, virtual banks, smart cards and other forms of new payments technologies can provide even greater convenience at lower costs. But will these new forms of payments also introduce new risks? That is a question that is hard to answer with certainty, but it is one we all need to be concerned about.

Some lessons from our experiences with the wholesale payments system may be valuable. Technology brought both efficiency and

increased service levels but also unanticipated results and increased risk. In the 70's and early 80's, technology was applied to payment and clearing systems with a vengeance. Automated payments processing and communications systems, such as Fedwire and CHIPS, experienced phenomenal growth in the number of on-line participants and in the volume and value of transactions processed. Bigger computers were linked using faster networks to carry increasing numbers of payments to more and more participants at ever increasing speed.

Throughout this period it seemed that "bigger" and "faster" meant "better". And, in many ways, this was true. However, our ability to deliver payment instructions and securities transactions outpaced our ability to achieve final settlement for these transactions. Payment instruction delivery was essentially real-time for on-line institutions, but final settlement -- the actual posting of entries to participants' settlement accounts -- was typically an end-of-day (or next day) processing activity. Even in systems that settle with each transaction -- so called real time gross settlement systems like Fedwire --payment transfers were completed without regard for balances on

hand. As a result, the amount of intra-day credit -- or what is called daylight overdrafts -- incurred by payments system participants grew at a staggering rate. Payment system risk was not created by technological change, but such change did increase the levels of risk and make risk control more difficult.

By the mid-80's, however, technology was being applied to improve risk control in domestic payments systems. Sophisticated software systems were developed to measure risk as a first step toward controlling it. With some prompting from regulatory authorities, risk management software began to be integrated with and operated as part of the payment system applications. Real-time balance monitoring, net debit caps and bi-lateral limits are all examples of automated risk management controls made possible by creative application of technology in wholesale payments systems. But it took a while to put the genie of technological progress back in the bottle, and rein in the risks in large value systems. If we aren't careful, we could repeat this painful process in the retail payments arena. And this is a situation that demands care and attention by the central bank.

The Federal Reserve System was established in 1914 with a primary responsibility of establishing a nationwide payment system. We do this by being a participant in the payment system, by being a catalyst for change in supporting new technologies, and by being a payment system regulator. We can look back with pride at the implementation of wire transfers, book-entry securities, MICR encoding on checks, the ACH, the RCPC's, and digital image research as major contributions made to the payment system starting in our earliest days. Since the passage of the Monetary Control Act in 1980, the Fed has both broadened its provision of services to all depository institutions and covered its costs by pricing those services. Increased competition has resulted in increased efficiency, lower costs, and improved service quality from all service providers, both Reserve Banks and the private sector, and in extraordinary reductions in float.

We have also used our regulatory power to improve the payment system, most recently by implementing same-day settlement in 1993. This change facilitated direct exchange of checks between financial institutions and reduced the intermediary role played historically by Reserve Banks. That was the right thing to do, and we did it both

because of our legislated role and because of the commitment we have to making payments faster and more efficient. Now we are faced, as I noted before, not only with great promise and uncertainty, but also with the potential to make sizable inroads into the paper payment flow in this country. We at the Fed want to help make this happen, but we want it to happen in a way that is as problem-free as possible.

None of us can predict accurately how the use of the internet, smart cards, debit cards and other new forms of payments will transform the payments system. However, together we have to create an environment that fosters the diffusion of electronic payments. This will require effective investments in these new technologies, a clear focus on risk issues, and massive amounts of public education.

The Federal Reserve has indicated it will approach regulation of new payment forms cautiously. In addition, collaboration with the industry on operational and standards issues can be highly effective. We in Boston are involved with many developers of new technologies and in a number of standards efforts. The development of standards is particularly critical to ensure both the interoperability and the security of new forms of payments.

Given the lessons learned in the wholesale payments system, we must be particularly vigilant about new forms of risk as new systems develop. I would venture to say that more credit is extended through the payments system than through any other single mode of credit extension. The Federal Reserve and the financial institutions have been heavily focused on the credit risks associated with the payments system for many years. The new providers of technology who offer products and networks that support retail payments do not have this history of experience with credit issues. All of us must ensure that these issues remain at the forefront of the development of new approaches.

As the electronic retail payment system develops, we will have to make careful trade-offs between the technological benefits of lower costs and greater convenience, and the needs for a secure and reliable system supported by a comprehensive set of rules and regulations and standards. New retail networks must have the control and oversight needed to contain risks that could result from ever increasing net settlement dollar amounts.

So far electronic money has evolved with limited transferability and with low value limits. However, developments in the technology for stored value cards, just as an example, clearly offer the potential for making much larger payments, with unlimited transferability. Such payments could be outside of any central monitoring or control system. Even now large dollar transactions flow over the ACH rather than the Fedwire system to avoid the fees associated with Fedwire transfers, and that becomes even more attractive as we all make ACH systems more flexible and easy to use. Proposals have been made to place limits on ACH transaction values. In a similar vein, the Reserve Banks recently announced that they would no longer accept for collection checks over $100 million. These are risk issues that we want to work with you to address.

The development of complementary technologies will be critical as new systems evolve. For example, we in Boston are studying new technologies that provide for security in payments, such as digital signatures, to determine whether we can play helpful roles that would facilitate the development of secure electronic payments.

None of these new technologies will be effective unless they meet the needs of consumers and corporations. We have a huge

educational effort ahead of us. Consumers and corporations are not even taking full advantage of existing safe electronic forms of payments, such as the ACH. Estimates of the penetration of direct deposit vary between 20% and 45%, but all agree that after 20 years with direct deposit, most American workers still are paid by check. Electronic payments of charitable contributions, bills, mortgages and so on are much more rare. How many of you still sit down at your desk, write out checks, and mail them to pay your bills each month? And how many companies even offer you a choice of payment methods?

During the past year the Federal Reserve has worked collaboratively with NACHA, the U.S. Treasury and the Social Security Administration to inform consumers and corporations about the benefits of direct deposit and direct payments. In 1995 the Reserve Banks mailed over 50,000 brochures to financial institutions and corporations related to the benefits of direct payments and this year we have a similar campaign for direct deposit. Here in New York the New York Automated Clearinghouse has mounted a massive educational campaign and we are participating on their Advisory Board. Reserve Banks also are moving to make more of their own payments

electronically. At the Boston Reserve Bank, we will convert all of our bill payments to electronics over the next three years.

Will all of this activity eliminate checks so that we can simply disinvest in the check system? Although I think the environment is more conducive today than it has been in the past to the conversion of paper payments, the over 60 billion check payments simply are not going to disappear tomorrow. We cannot afford, however, to continue to handle these payments 12 times on average in the interbank collection process. The banking industry has relied heavily on revenues derived from float and fee income from paper-based services, but the time has come to make the transition to electronic check collection. This will require investment in the paper system even as we make the transition to the electronic system. To minimize this investment, depository institutions and the Fed have to work together to find standard nationwide approaches to ECP that can bring efficiencies to the banking industry and the public. The Federal Reserve Bank of Boston is committed to taking a leadership role in this transformation.

In 1995, an ECP Industry Advisory Group was established that includes representatives of large and small banks, industry associations and check clearinghouses, all of whom share our conviction that we

need a more electronic, less paper-bound check system for the nation. The ECP Advisory Group is pursuing tests of low-dollar check truncation and return item image exchange, the latter involving the New York Clearing House and the Boston Reserve Bank in a joint effort. Behind these tests are many hours of customer-focused research and economic and legal analysis. These collaborative tests are helping us understand the issues from end-to-end that need to be resolved to pursue electronic check collection on a nationwide scale. The Boston Bank's role as a participant in these joint efforts will help us provide input to proposals for possible regulatory change that can facilitate the move to electronic check collection.

As a major provider of check services with a nationwide presence the Reserve Banks are developing an end-to-end electronic check infrastructure. Recent market research indicates clearly that most financial institutions will want to rely on intermediaries to provide storage, retrieval, and other supporting services in a more fully electronic check environment. The Banks all now offer electronic deposit and presentment services and more than 20% of the volume processed is presented electronically. Furthermore, this year several Banks are beginning to implement of check image services for the U.S.

Treasury, and are now offering commercial image services. We expect this image infrastructure to support the development of nationwide electronic check collection and return, to accelerate availability of funds, reduce costs, and to reduce the growing amount of check fraud.

The transformation that lies ahead of us requires both action and vigilance on all of our parts. The uncertainties require that we pursue many different paths to reach our goal and that we constantly focus on the payments system as an interdependent system rather than a sum of individual components. We can and we must take advantage of both the innovations today and the lessons from the past to ensure that the retail payments system evolves in a manner that will continue to support financial stability and economic growth.